MATHEMATICS TEST

60 Minutes—60 Questions

Directions: Solve each of the following problems, select the correct answer, and then fill in the corresponding space on your answer sheet. Don't linger over problems that are too time-consuming. Do as many as you can, then come back to the others in the time you have remaining.

Note: Unless otherwise noted, all of the following should be assumed:

1. Illustrative figures are not necessarily drawn to scale.
2. All geometric figures lie in a plane.
3. The term *line* indicates a straight line.
4. The term *average* indicates arithmetic mean.

DO YOUR FIGURING HERE.

1. The regular price for a certain bicycle is $125.00. If that price is reduced by 20%, what is the new price?

   A. $100.00
   B. $105.00
   C. $112.50
   D. $120.00
   E. $122.50

2. If $x = -5$, then $2x^2 - 6x + 5 = ?$

   F. −15
   G. 15
   H. 25
   J. 85
   K. 135

3. How many distinct prime factors does the number 36 have?

   A. 2
   B. 3
   C. 4
   D. 5
   E. 6

8. How many units apart are the points $P(-1,-2)$ and $Q(2,2)$ in the standard (x,y) coordinate plane?

   F. 2
   G. 3
   H. 4
   J. 5
   K. 6

9. In a group of 25 students, 16 are female. What percentage of the group is female?

   A. 16%
   B. 40%
   C. 60%
   D. 64%
   E. 75%

10. For how many integer values of x will $\frac{7}{x}$ be greater than $\frac{1}{4}$ and less than $\frac{1}{3}$?

    F. 6
    G. 7
    H. 12
    J. 28
    K. infinitely many

11. Which of the following is a polynomial factor of $6x^2 + 13x + 6$?

    A. $2x + 3$
    B. $3x - 2$
    C. $3x + 2$
    D. $6x - 2$
    E. $6x + 2$

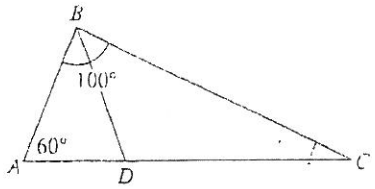
12. What is the value of a if $\frac{1}{a} + \frac{2}{a} + \frac{3}{a} + \frac{4}{a} = 5$?

    F. $\frac{1}{2}$
    G. 2
    H. 4
    J. $12\frac{1}{2}$
    K. 50

DO YOUR FIGURING HERE.

DO YOUR FIGURING HERE.

15. In the figure below, $\overline{BD}$ bisects $\angle ABC$. The measure of $\angle ABC$ is 100° and the measure of $\angle BAD$ is 60°. What is the measure of $\angle BDC$?



A. 80°
B. 90°
C. 100°
D. 110°
E. 120°

16. If $x + 2y - 3 = xy$, where x and y are positive, then which of the following equations expresses y in terms of x?

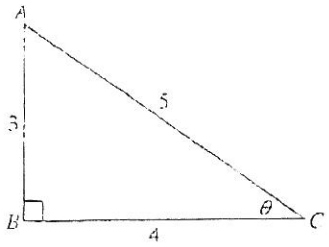
F. $y = \frac{3 - x}{2 - x}$
G. $y = \frac{3 - x}{x - 2}$
H. $y = \frac{x - 3}{2 - x}$
J. $y = \frac{x - 2}{x - 3}$
K. $y = \frac{6 - x}{x - 2}$

17. In a group of 50 students, 28 speak English and 37 speak Spanish. If everyone in the group speaks at least one of the two languages, how many speak both English and Spanish?

A. 11
B. 12
C. 13
D. 14
E. 15

22. In the figure below, $\angle B$ is a right angle, and the measure of $\angle C$ is θ. What is the value of $\cos\theta$?

DO YOUR FIGURING HERE.



F. $\frac{3}{4}$

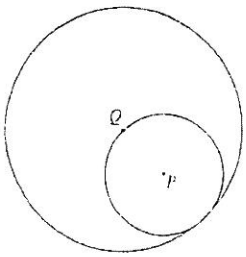
G. $\frac{3}{5}$

H. $\frac{4}{5}$

J. $\frac{5}{4}$

K. $\frac{4}{3}$

23. In the figure below, the circle centered at P is tangent to the circle centered at Q. Point Q is on the circumference of circle P. If the circumference of circle P is 6 inches, what is the circumference, in inches, of circle Q?



A. 12

B. 24

C. 36

D. 12π

E. 36π

29. The formula for converting a Fahrenheit temperature reading to Celsius is $C = \frac{5}{9}(F - 32)$, where C is the reading in degrees Celsius and F is the reading in degrees Fahrenheit. Which of the following is the Fahrenheit equivalent to a reading of 95° Celsius?

A. 35° F
B. 53° F
C. 63° F
D. 203° F
E. 207° F

30. A jar contains 4 green marbles, 5 red marbles, and 11 white marbles. If one marble is chosen at random, what is the probability that it will be green?

F. $\frac{1}{3}$
G. $\frac{1}{4}$
H. $\frac{1}{5}$
J. $\frac{1}{16}$
K. $\frac{1}{55}$

31. What is the average of the expressions $2x + 5$, $5x - 6$, and $-4x + 2$?

A. $x + \frac{1}{3}$
B. $x + 1$
C. $3x + \frac{1}{3}$
D. $3x + 3$
E. $3x + 3\frac{1}{3}$

32. The line that passes through the points (1, 1) and (2, 16) in the standard (x, y) coordinate plane is parallel to the line that passes through the points (−10, −5) and $(a, 25)$. What is the value of a?

F. −8
G. 3
H. 5
J. 15
K. 20

DO YOUR FIGURING HERE.

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35. If one solution to the equation $2x^2 + (a - 4)x - 2a = 0$ is $x = -3$, what is the value of a?

A. 0
B. 2
C. 4
D. 6
E. 12

DO YOUR FIGURING HERE.

36. A menu offers 4 choices for the first course, 5 choices for the second course, and 3 choices for dessert. How many different meals, consisting of a first course, a second course, and a dessert, can one choose from this menu?

F. 12
G. 24
H. 30
J. 36
K. 60

37. If an integer is divisible by 6 and by 9, then the integer must be divisible by which of the following?

I. 12
II. 18
III. 36

A. I only
B. II only
C. I and II only
D. I, II, and III
E. None

38. For all $x \neq 0$, $\frac{x^2 + x^2 + x^2}{x^2} = ?$

F. 3
G. $3x$
H. x^2
J. x^3
K. x^4

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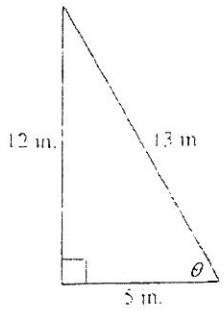
42. In the right triangle below, $\sin \theta = ?$

DO YOUR FIGURING HERE.



F. $\frac{5}{13}$

G. $\frac{5}{12}$

H. $\frac{12}{13}$

J. $\frac{13}{12}$

K. $\frac{13}{5}$

43. If $9^{2x-1} = 3^{3x+3}$, then $x = ?$

A. -4

B. $-\frac{7}{4}$

C. $-\frac{10}{7}$

D. 2

E. 5

44. From 1970 through 1980, the population of City Q increased by 20%. From 1980 through 1990, the population increased by 30%. What was the combined percent increase for the period 1970–1990 ?

F. 25%

G. 26%

H. 36%

J. 50%

K. 56%

DO YOUR FIGURING HERE.

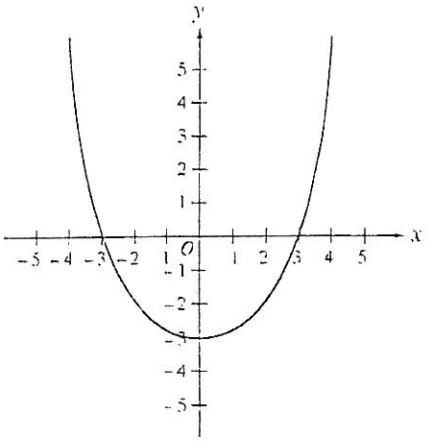
48. What is $\frac{1}{4}\%$ of 16?

F. 0.004
G. 0.04
H. 0.4
J. 4
K. 64

49. For all s, $(s + 4)(s - 4) + (2s + 2)(s - 2) = ?$

A. $s^2 - 2s - 20$
B. $3s^2 - 12$
C. $3s^2 - 2s - 20$
D. $3s^2 + 2s - 20$
E. $5s^2 - 2s - 20$

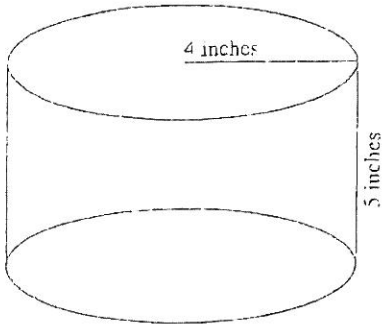
50. Which of the following is an equation of the parabola graphed in the (x,y) coordinate plane below?



F. $y = \frac{x^2}{3} - 3$
G. $y = \frac{x^2 - 3}{3}$
H. $y = \frac{x^2}{3} + 3$
J. $y = \frac{x^2 + 3}{3}$
K. $y = 3x^2 - 3$

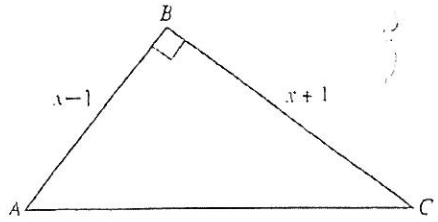
DO YOUR FIGURING HERE.

54. What is the volume, in cubic inches, of the cylinder shown in the figure below?



F. 20π
G. 40π
H. 60π
J. 80π
K. 100π

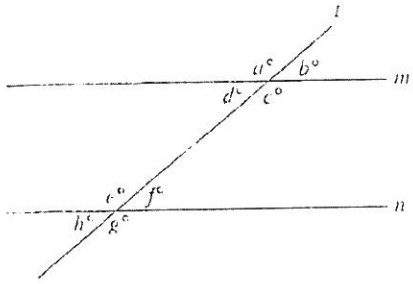
55. In the figure below, $\overline{AB}$ is perpendicular to $\overline{BC}$. The lengths of $\overline{AB}$ and $\overline{BC}$, in inches, are given in terms of x. Which of the following represents the area of ΔABC, in square inches, for all $x > 1$?



A. x
B. $2x$
C. x^2
D. $x^2 - 1$
E. $\frac{x^2 - 1}{2}$

60. In the figure below, line t crosses parallel lines m and n. Which of the following statements must be true?

DO YOUR FIGURING HERE.



F. $a = b$

G. $a = d$

H. $b = c$

J. $c = g$

K. $d = g$

IF YOU FINISH BEFORE TIME IS CALLED, YOU MAY CHECK YOUR WORK ON

STOP